

Requirements in the Affordability Crosshairs

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Warfighter capability. System requirement. Affordability. Between recent congressional direction, GAO reports, defense media pundits, DoD symposia, and a number of recent *Defense AT&L* articles, each has received more than its share of the limelight. During the semi-annual Program Manager's Forum

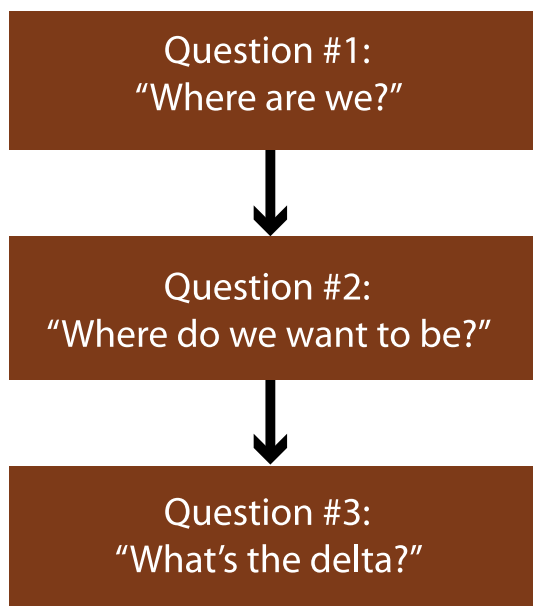
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hosted by DAU, over 20 major DoD PMs identify and rank their major issues and then provide a briefing to AT&L leaders. Since 2007, each briefing has listed some form of the term “requirements” in the top seven issues—usually in the top three. In fact, for the last two PM Forums (November 2010 and June 2011), the outbriefings listed “Requirements & Testing” as the no. 1 issue.

Combine this perception with President Obama’s goal of cutting DoD by nearly \$400 billion over the next 12 years, Secretary Panetta’s goal of restructuring the DoD to save that amount while still protecting national security, and Dr. Carter’s Better Buying Power initiatives. The result presents those of us in the requirements and acquisition communities with a prime opportunity to address long-standing process disconnects, thus improving the materiel solutions our warfighters use in battle while giving ourselves—the taxpayers—a needed cost break. The key is “Problem Solving 101”—analyzing our situation and asking three central questions:

Figure 1. The Three Questions



Question One: “Where are we?”

What exactly is a “requirement”? Merriam-Webster defines the term “requirement” simply as “something essential to the existence or occurrence of something else.” However, we in the DoD corporate structure often use this term to arbitrarily describe anything from a nuclear deterrent characteristic to a battlefield mission task to a contractual specification. For years, this “semantic imprecision” has led to confusion within the requirements, acquisition, and resourcing communities. Aside from the Joint Capability Areas (JCAs)—DoD’s method to describe military capabilities—there is little common usage. Thus, for purposes of this article only, let’s develop a meaningful lexicon using working definitions synthesized from a number of disparate sources. (See sidebar this page.)

Working Definitions of Requirements-Related Terms

Capability: The ability to achieve a desired objective in a military operation that supports national security under specified standards and conditions. Normally involves identifying war-time tasks, conditions, and standards.

Operational Requirement: A warfighter-defined and validated qualitative and quantitative parameter that specifies a needed capability and serves as a basis to define operational effectiveness and suitability—traceable to a capability.

Derived Requirement: A parameter not explicitly stated but derived through requirements analysis. It can result in DoD terms like Key Performance Parameters (KPPs) and Key System Attributes (KSAs) and is traceable to an operational requirement.

KPP, Key Performance Parameter: A quantitative system attribute the warfighter considers critical to the development of an effective military capability—observable, measurable, testable, and traceable to a derived requirement.

KSA, Key System Attribute: A quantitative system attribute the warfighter considers crucial to achieving a capability solution, but not as critical as a KPP—also observable, measurable, testable, and traceable to a derived requirement or KPP.

MOE, Measure of Effectiveness: A mission-oriented qualitative or quantitative measure of operational success closely related to the objective of the mission or operation being evaluated. MOEs are linked to the future testing of the system and often traceable to the Analysis of Alternatives (AoA).

MOP, Measure of Performance: A system-oriented quantitative measure of a system characteristic (e.g., range, velocity, mass, scan rate, weapon load-out, etc.) chosen to enable calculation of one or more MOEs. MOPs are also linked to future testing of the system and are traceable to MOEs.

Technical Requirement: A characteristic that the acquisition community can translate into a system specification that eventually goes on contract—traceable to a KPP or KSA.

Specification: A document the government can use to communicate to industry that characterizes the nature of the material, hardware, software, or service—traceable to a technical requirement.

What is the current mechanism of requirements development? Next, we need to briefly examine the governance that prescribes how DoD identifies warfighter capabilities and translates them into operational and derived requirements. In 2003, DoD issued Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3170 to implement the Joint Capability Integration Development System (JCIDS) with the goal of advancing capability analysis, improving operational requirements development, and promoting joint solutions to wartime problems. The current version is CJCSI 3170.01G; however, this guidance is changing.

What's the current status of JCIDS? "We're starting to rewrite JCIDS. It has been gamed to death and we're going to throw it away," said U.S. Marine Corps Gen. James Cartwright, vice chairman of the Joint Chiefs of Staff, at the April 14, 2011, National Space Symposium. "We're going to try to align ourselves with acquisition and three levels of risk. As we stand down Joint Forces Command, we will move that function into the J-7 of the Joint Staff. And we will align J8 and J-7. The J8 will be material solutions, J-7 will be non-material solutions. The two offices will work together under auspices of the vice chairman of the JCS."

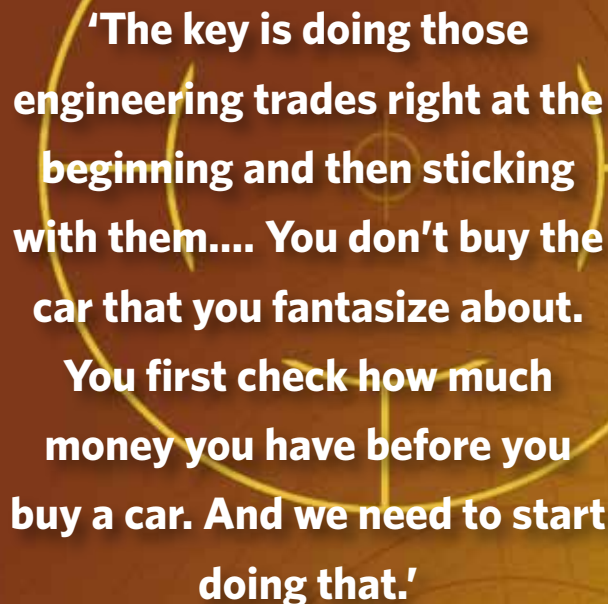
Specifically, to address these and other shortcomings in capabilities analysis and requirements development, the Joint Staff's Force Structure, Resources, and Assessment Directorate, J8, formally chartered a Joint Capability Development Process Review (JCDPR) on Sept. 9, 2010 to:

"...review the JCIDS and provide recommendations to improve the process's responsiveness and decision support to the Joint Requirements Oversight Council (JROC), COCOMs, Services, and Defense Agencies/Components... The process must interface with and support the defense acquisition system (DAS) and planning, programming, budget, and execution (PPBE) processes at multiple points."

Capability, requirements, and affordability areas this JCDPR effort addressed include: requirements creep, improving capability metrics, prioritizing capabilities, promoting joint solutions that properly balance cost, schedule, and performance, improving affordability integration in the requirements development process, and developing incremental performance parameters and metrics.

J8 is also implementing the Capability Development Tracking Management (CDTM) system. CDTM is essentially a TurboTax-style fill-in-the-blank system for all DoD requirements documents. Its goal: move DoD's capability and requirements development from being "document-centric" to "data-centric." For the acquisition and resourcing communities, this should improve the speed of documenting and staffing capabilities and requirements as well as improve the consistency of the documents the JROC reviews. Additionally, J8 intends for CDTM to improve requirements traceability throughout the acquisition and resourcing processes, a persistent source of PM headaches and system cost increases.

How does all this impact affordability? In a word: stability. Stability in the form of requirements, funding, and schedule. It means doing the hard, up-front work correctly (and quickly) from the very beginning—starting with warfighter capability analysis. It also means using mechanisms later in the acquisition process such as Configuration Steering Boards (CSBs) and design reviews to fight costly "requirements creep" and schedule extensions. All of these collectively serve the affordability cause.



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Question Two: "Where do we want to be?"

What has leadership said about this capability/requirements/affordability disconnect? Some of former Secretary Gates' views that relate capability and requirements to affordability goals:

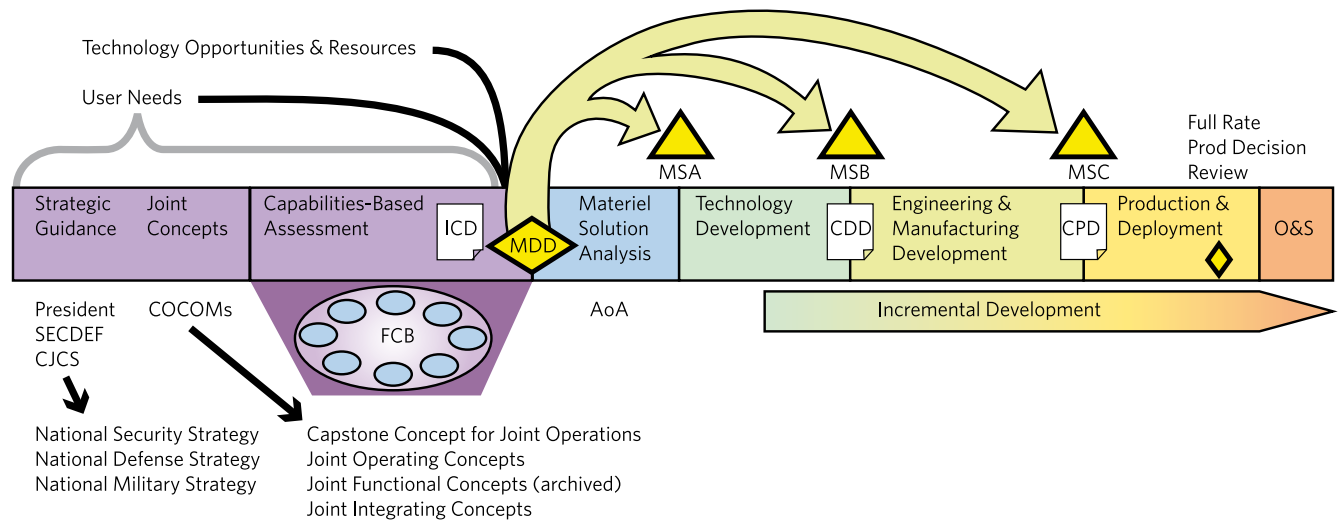
- "Affordability will be incorporated right at the beginning as a firm requirement for each new program..."
- "...we're trimming requirements without compromising critical capability."
- "Finally, while most people think of aircraft, ships, tanks and other weapons when they think of defense spending...DoD spends \$220 billion on contracting for professional services, IT and facilities upkeep."

Dr. Carter's related thoughts:

- On being questioned about DoD's use of CSBs to increase requirements stability: "Yes, I support activities such as Configuration Steering Boards that prevent unnecessary changes to program requirements or system configuration that could have an adverse impact on program cost and/or schedule."
- "The key is doing those engineering trades right at the beginning and then sticking with them.... You don't buy the car that you fantasize about. You first check how much money you have before you buy a car. And we need to start doing that."
- "The alternative is broken programs, canceled programs, budgetary turbulence, the kind of unpredictability and uncertainty that are bad for industry; the erosion of taxpayers' confidence that they're getting value for their money; and of course, worst of all, lost warfighter capability.... It's now time for a DoD-wide behavioral shift."

Secretary Panetta's views in response to congressional questions:

Figure 2. Requirements and Acquisition



- "Secretary Gates has discussed with me his overall approach for the Comprehensive Review. It is my understanding that the process initiated focuses principally on driving program and budget decisions from choices about strategy and risks. Such a strategy-driven approach is essential to ensuring that we preserve a superb defense force to meet national security goals, even under fiscal pressure."
- "I will work with both DoD's civilian and military leaders to seek the right balance and I will not hesitate to provide my views on the potential consequences of proposed future changes in the DoD's budget."

Question Three: "What's the delta?"

How do we get there? What might this behavioral shift demand?
The maximum ability to impact a system's eventual affordability equation occurs at the very beginning of the effort to address a validated military capability gap. At this point in the process, DoD has spent little contractual money, prime contractors have not started the design work nor have subcontractors begun to bend metal. Nothing exists but the validated capability gap and possibly some government laboratory and industry Independent Research and Development (IR&D) findings. If done thoroughly (without sliding down that "paralysis by analysis" slope), these efforts can have a very positive impact on the price we ultimately pay for our systems. This pertains to new systems, replacement systems, or the resurrection of a cancelled Program of Record.

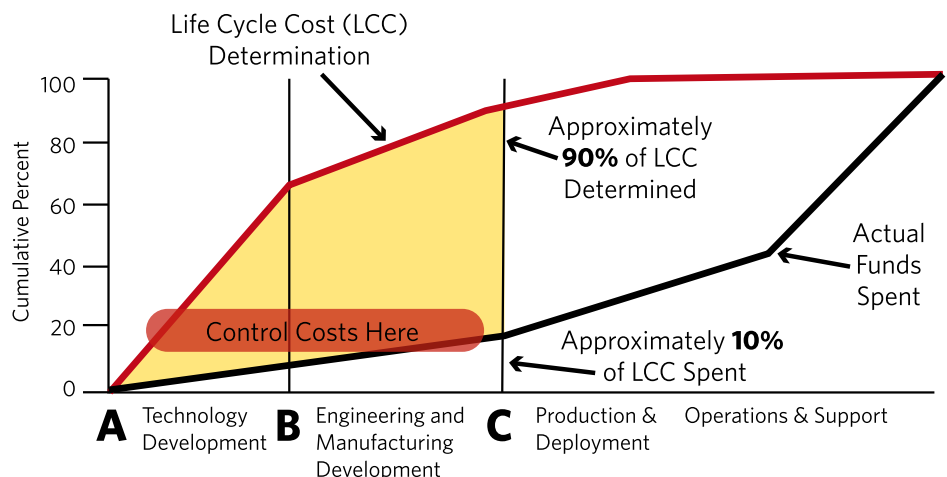
Furthermore, how does the operational requirements/affordability

connection progress as the materiel solution evolves? Since capabilities analysis, operational requirements generation, and affordability are so interdependent, let's model this process chronologically from the very beginning, using the framework in Figure 2 and moving from left to right:

Pre-Material Development Decision (MDD)

At the far left, capability analyses are the foundation for operational and derived requirements that ultimately impacts war-fighter battlefield performance. A DoD service or agency sees a problem—a possible capability gap that needs investigating. Using strategic guidance documents such as the Quadrennial Defense Review (QDR) and National Military Strategy (NMS) as well as joint conceptual documents such as the Joint Operating Concepts (JOC), Joint Capability Areas (JCAs), and existing archival data, the very first step is for the service or agency to initiate and fund a Capabilities-Based Assessment (CBA). If the CBA's findings and recommendations are rigor-

Figure 3. Life Cycle Affordability



ous and compelling enough to investigate a materiel solution, it's documented and staffed in the first of the requirements documents, the Initial Capabilities Document (ICD). This task is in the domain of the service requirements manager (RM) since there is no formal program office yet.

How do these early capability analyses impact affordability? Simply put, form follows function—system design and configuration follows technical and operational requirements established by early capability analyses. Identification of needed capabilities, gaps, and risks starts a causality chain that significantly impacts the system in a non-linear fashion as depicted in Figure 3.

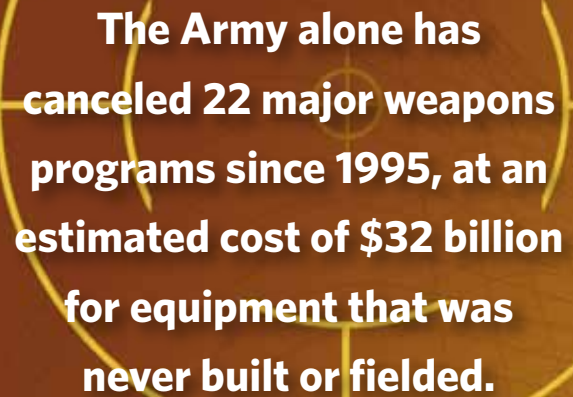
For a typical DoD acquisition, by Milestone B the taxpayer has paid out less than 10 percent of life cycle cost funds yet the decisions coming from the capabilities analysis, operational and derived requirements development, and materiel acquisition processes have locked in over 60 percent of life cycle funds. At Milestone C, this figure rises to over 90 percent.

Where do our affordability problems begin? Highly variable capability analyses (ranging from nonexistent to multi-year studies) and operational requirements development can only increase a systems life cycle cost. Early capability analyses and operational and derived requirements development might appear too difficult, too costly, and too lengthy—and therefore tempting to rush through with minimum resources. However, players within the system must exercise discipline and do the proper analyses. Failure to do so negatively impacts not only solution selection but also creates the environment for developing inaccurate, overly-optimistic cost estimates. Unfortunately, given the time and money expended starting at MDD through retiring and disposing of the system, these inadequate capability analyses inevitably create a huge, unnecessary burden on the taxpayer—as evidenced by some recent, high-dollar Program of Record cancellations. The Army alone has canceled 22 major weapons programs since 1995, at an estimated cost of \$32 billion for equipment that was never built or fielded.

Conversely, when done with discipline and the proper level of rigor, these analyses set up the program to achieve maximum affordability for a given capability. Additionally, significant savings can still occur during subsequent phases for any materiel acquisition. During the acquisition process, it's the PM's job to explain and defend the acquisition strategy while it's the RM's job to explain and defend warfighter operational requirements. However, ensuring the effort fulfills the warfighter's capability needs in the most cost-effective way is a cooperative effort. Let's examine these RM/PM interactions and taskings.

Post-MDD Technical Requirements Impact on Affordability

To support system affordability, the RM's job description evolves after the MDD into one of working within the acquisition and resourcing processes. Here, the RM helps ensure the various funding, technology development and maturity,



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hardware, software, and support systems are focused on meeting warfighter capability needs. As the program evolves, the technical requirements become more refined and measurable—they evolve from capability gaps to KPPs to various contractual specifications and testing criteria. The RM's focus also evolves to keeping the focus on the warfighter to prevent the subtle but costly phenomenon of "requirements creep." Naturally, this includes supporting all Configuration Steering Boards (CSBs) to review all operational, derived, and technical requirements and significant technical configuration changes that have the potential to impact cost and schedule.

Material Solution Analysis (MSA)

During MSA, the RM serves affordability by helping the Analysis of Alternatives (AoA) Study Team understand the concepts of operation, as well as any Reliability, Availability, Maintainability Cost (RAM-C) goals for any proposed new capability. The RM then begins drafting a Capability Development Document (CDD) reflecting AoA results—the information in this draft CDD in turn helps develop the Request for Proposal (RFP). Systems engineering help is vital to the RM to ensure the KPPs and other operational performance parameters are technologically possible. If no program office yet exists, the RM works with the systems engineers at the acquisition command.

Technology Development (TD)

During TD, the RM impacts affordability by participating in program technical reviews, helping engineers understand operational and derived requirements and CONOPS, with the goal of writing better technical requirements and minimizing the number of KPPs and KSAs. Minimizing these significantly improves the chances for the program office and industry to deliver the solution on cost, on schedule, and with the right amount of performance—again, enhancing ultimate affordability. The RM also develops the final CDD after considering Preliminary Design Review (PDR) trades—in addition to participating in other program, technical, and decision reviews.

ACQUIPEDIA

ACQUISITION ENCYCLOPEDIA OF COMMON TERMS

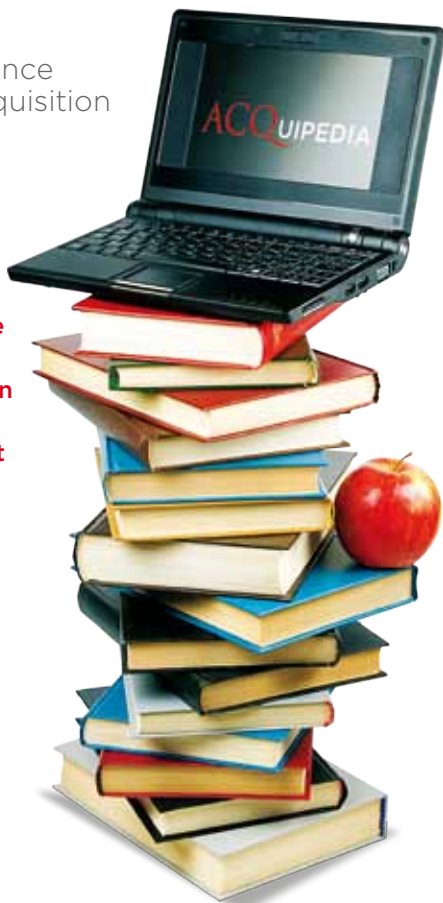
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Finally, RMs should be providing advice and assistance to the PM in development of the Acquisition Strategy, Acquisition Program Baseline (APB), Test and Evaluation Master Plan (TEMP), and the Life Cycle Sustainment Plan (LCSP)—all vital to determining ultimate system affordability.

Engineering and Manufacturing Development (EMD)

During EMD, the RM's impact on ultimate affordability lessens but is still vital to ensuring the program stays focused on the warfighter in the most efficient manner possible. RM duties include: ensuring all CDD performance attributes are "testable" by observing testing events; reviewing the CDD and the draft Capability Production Document (CPD) against these results, participating in T&E Working IPTs at the Pentagon level and T&E IPTs at the program office level; finalizing the CPD, revising the CONOPS prior to Milestone C, and helping the PM prepare for the Post-CDR Assessment, any resulting CSBs, and MS C.

Production and Deployment (PD)

During PD, RMs continue to assist the PM and their duties include continuation of all the duties listed above in EMD as well as assisting the PM with preparing for the Full-Rate Production Decision Review (FRPDR).

Operations and Support (O&S)

During O&S, the RMs should maintain contact with both the warfighter and the PM—this is after all, the most important phase for the warfighter. Here, the impact on affordability evolves again. RM O&S duties include: understanding that modifications and upgrades are not cheap and require program and budget lead time and funding justification, understanding that modifications and upgrades may be treated as new ACAT programs, and tracking threat, emerging technology, and life cycle cost reduction initiatives. They also obtain information on operations and support issues of the fielded system to support the next increment of an evolutionary acquisition strategy.

Summary

The foundation of system affordability begins during Pre-MDD capabilities analysis by carefully and thoughtfully analyzing warfighter capability needs. The affordability emphasis then evolves into immediate Post-MDD translation of validated capability gaps into usable operational, derived, and technical requirements, specifications, and metrics. Significant savings opportunities continue during later Post-MDD phases by cooperative diligence on the part of both RMs and PMs. This PM/RM team continuously reviews—and trades off if necessary—various requirements throughout the entire acquisition life cycle. Mutually supporting and accomplishing these tasks can go far to ensuring that early capability analyses, stable requirements development, and diligent materiel execution fully and competently support not only the needs of our warfighters in battle, but also the taxpayers who fund them.

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